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PATENT APPLICATION
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In The United States Patent and Trademark Office
On Appeal From The Examiner To The Board
of Patent Appeals and Interferences

In re Application of:	Li (nmi) Mo et al.
Serial No.:	09/848,994
Filing Date:	May 4, 2001
Group Art Unit:	2664
Examiner:	Son Xuan Nguyen
Title:	Method and System for Quality of Services (QoS) Support in a Packet-Switched Network

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Willie Jiles
Willie Jiles

Date: December 21, 2005

Dear Sir:

Appeal Brief

Appellants have appealed to the Board of Patent Appeals and Interferences from the decision of the Examiner mailed July 26, 2005, finally rejecting Claims 1-20, all of which are pending in this case. Appellants filed a Notice of Appeal on October 25, 2005. Appellants respectfully submit this Appeal Brief with the statutory fee of $500.00.

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Real Party In Interest

This application is currently owned by Fujitsu Limited, as indicated by an assignment recorded on July 19, 2001, in the Assignment Records of the United States Patent and Trademark Office at Reel 012015, Frames 0243-0247.

Related Appeals and Interferences

There are no known appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision regarding this appeal.

Status of Claims

Claims 1-20 are pending in this application. Claims 1-20 are rejected pursuant to a final Office Action mailed July 26, 2005, and are all presented for appeal. All pending claims are shown in Appendix A.

Status of Amendments

All amendments submitted by Appellants were entered by the Examiner before the issuance of the final Office Action mailed July 26, 2005.

Summary of Claimed Subject Matter

Particular embodiments of the present invention provide a mapping of external quality of service (QoS) classes into a reduced set of internally defined QoS classes while supporting essential features of the external QoS classes. An example of such embodiments is described below.

FIGURE 1 of the application illustrates a transport network 10 in accordance with one embodiment of the present invention. In this embodiment, the transport network 10 is an Internet protocol (IP) network for transporting IP and Multiple Protocol Label Switch (MPLS) packets. The transport network 10 may be any other packet-switched network operable to route, switch, and/or otherwise direct data packets based on network protocol addresses. The transport network 10 is a private network connecting geographically distributed segments of an external network 12. It includes a plurality of Internet protocol transport (IPT) nodes 30 interconnected by communication links 32. The IPT nodes 30 each include a plurality of ports 34 accessible to the external network 12. The communication links 32 are optical fiber or other suitable high-speed links. The high-speed links 32 connect high speed interfaces of the IPT nodes 30 to form fast transport segments (FTS) through the transport network 10. Packets transferred via the FTSs incur very small buffering delay in the network. Packets carried through the ports 34 and between FTSs may incur queuing delay comparable to a normal IP switch. *Page 8, lines 3-13 and 25-32; Page 9, lines 1-7.*

To support voice, video, and other real-time or time-sensitive applications, the transport network 10 provides quality of service (QoS), which may include class of service (CoS), differentiation. In one embodiment, all IP packets are mapped to one of three priority levels as they enter the transport network 10. In this embodiment, guaranteed traffic has reserved bandwidth and is guaranteed to be transported within a defined time delay. *Page 10, lines 7-15.*

In one embodiment, the transport network 10 utilizes a private internal addressing scheme to isolate the network 10 from customers and thus minimize or prevent conflicts with private and/or public networks connected to the transport network 10. This reduces the complexity of network management and preserves the topology of the existing routed network 12. In addition, transport network isolation enables value added services to be

provided through the transport network 10. When an independent addressing scheme is utilized for the transport network 10, egress traffic is converted from the external addressing scheme to the internal addressing scheme at ports 34 using standardized or extended network address translation (NAT). Similarly, egress traffic is converted from the internal addressing scheme back to the external addressing scheme at ports 34 using standard or extended NAT. In addition to the internal addresses, each IPT node 30, port 34 and other component of the transport network 10 visible to the external network 12 includes a globally unique IP address. These addresses are used for external management of the transport network 10. *Page 10, line 27 – Page 11, line 16.*

FIGURE 3 of the application illustrates details of an example IPT node 30. The IPT node 30 includes one or more receiver-transceiver pairs (RTP) 100 and a processing system 102 interconnected by an internal Ethernet connection. Each RTP 100 includes one or more internal interfaces 104 and one or more local interfaces 106. The internal interfaces are high-speed interfaces between the IPT nodes 30 while the local interfaces 106 are low-speed ports 34 accessible to external nodes and/or interfaces between FTSs. *Page 13, line 29 – Page 14, line 6.*

FIGURE 5 of the application illustrates details of an example RTP 100. The local interface 106 of the RTP 100 includes a plurality of low-speed interface cards 130. The low-speed interface cards 130 send and receive traffic to and from a multiplexer 124 and a demultiplexer 122, respectively. The low-speed interface cards 130 also provide connections between the FTSs. *Page 17, line 31 – Page 18, line 4.* Low-speed interface cards 130 may each include a buffer for each internal QoS class, which as previously described, may be guaranteed service, control load and best effort. In this and other embodiments, each buffer may discard packets based on its own thresholds, independent of the others. Because guaranteed service and control-load traffic have reserved paths, conforming traffic typically will not be dropped. Best-effort traffic will be dropped based on congestion at the node. *Page 18, lines 12-21.*

Traffic received by the interface cards 130 from external links are associated with a corresponding data flow and a transport label generated for and/or added to packet for transport through the network. In generating the label, the interface card 130 maps the external QoS class to one of the reduced number of internal QoS classes. The external QoS

classes are defined outside or independently of the transport, private or other suitable network and may be well-defined classes such as standardized classes. The internal QoS classes are defined by and/or within the network. The packet with the appended label is queued in a corresponding buffer and transmitted across the network along a path identified by the label and based on its internal QoS class. To provide a QoS guarantee for each new traffic flow, a path through the network that has sufficient resources to meet the flow's requirements is identified. The flow's requirements may be bandwidth and/or delay guarantees. *Page 18, line 22 – Page 19, line 8.*

FIGURE 6 of the application illustrates combining packets having disparate external QoS classes into internal IPT QoS classes for transport in the network 10 in accordance with one embodiment of the present invention. In this embodiment, integrated and differentiated services classes are combined into three internal IPT classes. It will be understood that other standardized or well-defined service classes may be similarly combined into the reduced or other suitable set of internal QoS classes without departing from the scope of the present invention. Referring to FIGURE 6, the internal QoS classes include an IPT guaranteed service class (gs) 140, an IPT control load (CL) class 142, and an IPT best effort (BE) class 144. In an particular embodiment, the IPT GS class 140 is characterized by low latency with delayed bound guarantees and a low drop priority. This service utilizes reservation. The IPT CL class 142 is characterized with no delay bound guarantees but with flexible drop priority. This class also uses reservation. The IPT BE class 144 provides no delivery guarantees in accordance with transmission of standard data traffic over the Internet. The IPT classes 140, 142 and 144 together support a subset of the standardized QoS features with non-essential features combined to reduce the number of QoS classes, which may reduce the cost and complexity of the network 10. Accordingly, the IPT classes 140, 142 and 144 each represent a queuing behavior type and/or behavior aggregate. *Page 21, lines 3-31.*

Grounds of Rejection to be Reviewed on Appeal

Appellants request that the Board review the Examiner's rejection of Claims 1-20 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,452,915 issued to Jorgensen.

Argument

Claims 1-20 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,452,915 issued to Jorgensen ("*Jorgensen*"). The Examiner's rejections of Claims 1-20 is improper, and the Board should withdraw the rejections for the reasons given below.

I. The Examiner's Rejection of Independent Claims 1, 10, 19 and 20 is Improper

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ.2d 1051, 1053 (Fed. Cir. 1987); M.P.E.P § 2131. In addition, "[t]he identical invention must be shown in as complete detail as is contained in the . . . claims" and "[t]he elements must be arranged as required by the claim." *Richardson v. Suzuki Motor Co.*, 9 USPQ.2d 1913, 1920 (Fed. Cir. 1989); *In re Bond*, 15 USPQ.2d 1566 (Fed. Cir. 1990); M.P.E.P § 2131 (*emphasis added*).

Claim 1 of the present application recites the following limitations:

> A method for transporting traffic having disparate qualities of service across a packet-switch network, comprising:
>
> receiving at an ingress point of a network a plurality of packets each comprising a quality of service (QoS) class defined externally to the network;
>
> combining packets having a QoS class comprising delay bound guarantees and a low drop priority into a first internal QoS class;
>
> combining packets having a QoS class comprising a flexible drop priority and no delay bound guarantees into a second internal QoS class;
>
> combining packets having a QoS class comprising no delivery guarantees into a third internal QoS class; and
>
> transporting the packets through the network based on their internal QoS classes.

Claims 10, 19, and 20 recite similar, although not identical, limitations.

Claim 1 is allowable because *Jorgensen* does not disclose each and every one of these limitations. For example, *Jorgensen* does not disclose "receiving at an ingress point of a network a plurality of *packets each comprising a quality of service (QoS) class defined*

externally to the network." In the Final Office Action, the Examiner asserts that this limitation is disclosed at Column 50, lines 48-57. As indicated in this passage, the packet header field information of a packet associated with the disclosure of *Jorgensen* "can be used to identify IP flows and the QoS requirements of the IP flows." The passage goes on to list what fields may be included in the header – none of which are a QoS class. This passage simply indicates that the QoS requirements can be determined *from the* information in the header, not that the header *includes* QoS class as required by the claims.

This interpretation is consistent with the passage previously cited by the Examiner as disclosing this limitation (Column 47, lines 52-62 of *Jorgensen*). This passage states the following:

> During identification, it is determined whether a data packet of an incoming IP data flow is known to the system, i.e. is an "existing IP flow", or rather is the first data packet of a new IP data flow, based on fields in a packet header section. Identification can also include, e.g., determining the source of the packet in order to extrapolate the type of information in the packet payload.
>
> During characterization, a new data packet (of a new IP data flow) previously unknown to the system *is characterized based on the packet header information to determine the QoS requirements for the IP data flow*, and to identify the subscriber CPE station that will receive the IP data flow.
>
> During classification, the new IP data flow is classified into a communications priority class. Classification can also include grouping together packets from different IP flows having similar characteristics into a single class. Example class groupings of IP flows 630 are illustrated as IP classes 810a-810g.

(emphasis added). As indicated by the italicized language, the system of *Jorgensen* does not receive packets that each include a QoS class defined externally to the network. Instead, the system receives packet and determines, once received, the QoS requirements for the packet based on information about the packet (not based on an externally defined QoS class), as described below. The packet (and other packets in the same data flow) can then be classified based on these determined QoS requirements into an *internal* priority class.

The process of receiving packets and characterizing the packets to determine the QoS requirements for each packet is described in greater detail in *Jorgensen* with respect to Figure 15A. This description first describes the identification of received packets as follows:

> 3. Identification
>
> Packet header identification component 1502 identifies the IP flow received from data network 142 at data interface 320 based on the packet header.
>
> An IP flow packet stream from data network 142, including packets from various IP flows (where each IP flow is associated with a single data "call") is received at packet header identification component 1502. . . .
>
> For IP flows known to the system, so-called "existing IP flows," there are entries in a table 1526. . . . If so, then the IP flow is known to the system, and control passes to module 1530 of the packet characterization component 1504.
>
> If not, meaning that the IP flow is a new IP data flow, then control passes to module 1524, where the packet header fields are analyzed. Module 1524 analyzes the packet header source field and determines from source application packet header data table 1528 the type of source application making the data call or transmitting the IP packet. . . .
>
> Once the type source application has been determined by packet header information or by another means, such as direct application identification, then control passes from module 1524 to module 1532 of the packet characterization component 1504.

Column 60, line 19 – Column 61, line 1 (with portions omitted). Therefore, when the *Jorgensen* system encounters a packet from a new data flow, it analyzes the header source field of the packet and uses the source of the packet indicated in the header to look-up an application associated with the packet in a table. *Jorgensen* then goes on to describe the characterization and classification of the identified packets as follows:

> 4. Characterization
>
> Packet characterization component 1504 characterizes new IP flows and passes them to packet classification component 1506 for classification.
>
> . . .
>
> For a new IP flow, control passes to module 1532 from module 1524 of the packet header identification component 1502. If in module 1524 it is determined that the IP flow is not known to the system, in module 1532 *the QoS requirements for the application are determined using the source application information identified in modules 1524 and 1528. Module 1532 performs this operation by looking up the QoS requirements for the identified*

> *source application in the QoS requirement table 1534. Different applications have different QoS requirements in order to provide an acceptable end-user experience.*
>
> . . .
>
> 5. Classification
>
> Packet classification component 1506 classifies the IP flow and passes it to IP flow presentation component 1508 for presentment.
>
> . . .
>
> For the new IP flow, control passes to module 1542 from module 1536 of the packet characterization component 1504. In module 1542 the packet is classified into a QoS class by performing a table lookup into IP flow QoS class table module 1544, where the types of QoS classes are stored depending on the QoS requirements for packets. Similar IP flows, (i.e., IP flows having similar QoS requirements) can be grouped together in module 1542.

Column 61, lines 4-29; Column 61, line 51 – Column 62, line 8 (emphasis added; with portions omitted). Therefore, using the source application information determined from the source address of the packet, the system looks up the QoS requirements for that particular application in a table. Finally, the packet is then classified into an internal QoS class based on QoS requirements that were determined by the table look-up.

Therefore, when a packet is received in *Jorgensen* system, it does <u>not</u> have a "quality of service (QoS) class *defined externally* to the network," as recited in Claim 1. Instead, the *Jorgensen* system includes intelligence in the form of various tables to determine the QoS requirements for that packet based on the application that sent the packet. The packet can then be classified into an *internal* QoS class and transmitted over the network of which the system is a part. There is no external QoS class that is used to determine how to classify the packet into one of these internal QoS classes.

Furthermore, because the inbound packets do not have an externally-defined QoS class, *Jorgensen* also cannot disclose combining packets having particular external QoS classes into a particular internal QoS class, as recited in the "combining" limitations of Claim 1. And more specifically, *Jorgensen* does not disclose "combining packets having a QoS class comprising *delay bound guarantees* and a *low drop priority* into a first internal QoS class," "combining packets having a QoS class comprising a *flexible drop priority* and *no delay bound guarantees* into a second internal QoS class," or "combining packets having a

QoS class comprising *no delivery guarantees* into a third internal QoS class." Since *Jorgensen* discloses no external QoS classes, it does not disclose that the particular types of external QoS classes recited in Claim 1 are combined into internal QoS classes.

For at least these reasons, Appellants submit that independent Claim 1 (as well as independent Claims 10, 19 and 20, which include similar limitations to those discussed above) are allowable over *Jorgensen*. Furthermore, the claims that depend from Claims 1 and 10 are at least allowable as depending from an allowable independent claim. Therefore, Appellants respectfully request allowance of Claims 1-20.

II. The Examiner's Rejection of Dependent Claims 2-4 and 11-13 is Improper

The fact that *Jorgensen* does not disclose external QoS classes is even more apparent when considering dependent Claims 2-4 (and similarly Claims 11-13). These dependent claims define very specific external QoS classes that are combined into specific internal QoS classes. For example, Claims 2 and 11 recite that packets having an externally-defined "integrated services guaranteed service" QoS class and an externally-defined "differentiated services expedited forwarding" QoS class are combined into an internal "guaranteed service class." There is simply no disclosure in *Jorgensen* of these specific types of classes. Similarly, there is no disclosure in *Jorgensen* of the specific types of classes recited in Claims 3 and 12 and Claims 4 and 13. Furthermore, the Examiner has not provided an adequate explanation as to how these specific QoS classes are disclosed in *Jorgensen*.

For at least this additional reasons, Appellants submit that dependent Claims 2-4 and 11-13 are allowable over *Jorgensen*. Therefore, Appellants again respectfully request allowance of these claims.

Conclusion

Appellants have demonstrated that the present invention, as claimed, is clearly distinguishable over the prior art cited by the Examiner. Therefore, Appellants respectfully request the Board of Patent Appeals and Interferences to reverse the final rejection of the Examiner and instruct the Examiner to issue a notice of allowance of all claims.

Appellants have enclosed a check in the amount of $500.00 for this Appeal Brief. Appellants believe no additional fees are due. The Commissioner is hereby authorized to charge any fee and credit any overpayment to Deposit Account No. 02-0384 of Baker Botts L.L.P.

Respectfully submitted,

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Appendix A: Claims on Appeal

1. (Original) A method for transporting traffic having disparate qualities of service across a packet-switch network, comprising:

receiving at an ingress point of a network a plurality of packets each comprising a quality of service (QoS) class defined externally to the network;

combining packets having a QoS class comprising delay bound guarantees and a low drop priority into a first internal QoS class;

combining packets having a QoS class comprising a flexible drop priority and no delay bound guarantees into a second internal QoS class;

combining packets having a QoS class comprising no delivery guarantees into a third internal QoS class; and

transporting the packets through the network based on their internal QoS classes.

2. (Original) The method of Claim 1, wherein the first internal QoS class comprises a guaranteed service class, further comprising combining into the guaranteed service class packets having an externally defined integrated services guaranteed service QoS and a differentiated services expedited forwarding QoS.

3. (Original) The method of Claim 1, wherein the second internal QoS class comprises a control load class, further comprising combining into the control load class packets having an externally defined integrated services control load QoS and a differentiated services assured forwarding 1, 2 and 3 QoS.

4. (Original) The method of Claim 1, wherein the third internal QoS class comprises a best-effort class, further comprising combining into the best-effort class packets having a differentiated services assured forwarding 4 QoS and a differentiated services best-effort QoS.

5. (Original) The method of Claim 1, wherein the packets combined into the first internal QoS class comprise low latency delay-bound guarantees.

6. (Original) The method of Claim 1, further comprising generating a label for each packet including the internal QoS class for the packet and transporting the packet through the network using the label.

7. (Original) The method of Claim 1, wherein the packets comprise internet protocol (IP) packets.

8. (Original) The method of Claim 1, wherein packets combined into the first internal QoS class comprise real-time data.

9. (Original) The method of Claim 1, wherein the packets combined into the first internal QoS class comprise real-time voice data.

10. (Original) A system for transporting traffic having disparate qualities of service across a packet-switch network, comprising:

means for receiving at an ingress point of a network a plurality of packets each comprising a quality of service (QoS) class defined externally to the network;

means for combining packets having a QoS class comprising delay bound guarantees and a low drop priority into a first internal QoS class;

means for combining packets having a QoS class comprising a flexible drop priority and no delay bound guarantees into a second internal QoS class;

means for combining packets having a QoS class comprising no delivery guarantees into a third internal QoS class; and

means for transporting the packets through the network based on their internal QoS classes.

11. (Original) The system of Claim 10, wherein the first internal QoS class comprises a guaranteed service class, further comprising means for combining into the guaranteed service class packets having an externally defined integrated services guaranteed service QoS and a differentiated services expedited forwarding QoS.

12. (Original) The system of Claim 10, wherein the second internal QoS class comprises a control load class, further comprising means for combining into the control load class packets having an externally defined integrated services control load QoS and a differentiated services assured forwarding 1, 2 and 3 QoS.

13. (Original) The system of Claim 10, wherein the third internal QoS class comprises a best-effort class, further comprising means for combining into the best-effort class packets having a differentiated services assured forwarding 4 QoS and a differentiated services best-effort QoS.

14. (Original) The system of Claim 10, wherein the packets combined into the first internal QoS class comprise low latency delay-bound guarantees.

15. (Original) The system of Claim 10, further comprising means for generating a label for each packet including the internal QoS class for the packet and transporting the packet through the network using the label.

16. (Original) The system of Claim 10, wherein the packets comprise internet protocol (IP) packets.

17. (Original) The system of Claim 10, wherein packets combined into the first internal QoS class comprise real-time data.

18. (Original) The system of Claim 10, wherein the packets combined into the first internal QoS class comprise real-time voice data.

19. (Original) A system for transporting traffic having disparate qualities of service across a packet-switch network, comprising:

logic encoded in media; and

the logic operable to receive at an ingress point of a network a plurality of packets each comprising a quality of service (QoS) class defined externally to the network, to combine packets having a QoS class comprising delay-bound guarantees and a low drop priority into a first internal QoS class, to combine packets having a QoS class comprising a flexible drop priority and no delay bound into a second internal QoS class, and to combine packets having a QoS class comprising no delivery guarantees into a third internal QoS class.

20. (Previously Presented) A local interface for a packet-switched network node, comprising:

a port operable to receive a plurality of packets each comprising a quality of service (QoS) class defined externally to a network of the node and to combine packets having QoS classes comprising delay-bound guarantees and a low drop priority into a first internal QoS class, to combine packets having a QoS class comprising a flexible-drop priority and no delay bound guarantees into a second internal QoS class and to combine packets having a QoS class comprising no delivery guarantees into a third QoS class and to buffer the packets in buffers corresponding to their internal QoS classes; and

a scheduler operable to schedule transmission of the packets out of the buffers for transmission over the network based on their internal QoS class.

Appendix B: Evidence

NONE

Appendix C: Related Proceedings

NONE